CONSULTANT REPORT

Summary of Needs for Improving the Energy Efficiency of California's Existing Nonresidential Buildings

- Findings from interviews with industry experts

Prepared for: California Energy Commission

Prepared by: PECI

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PREFACE

This Needs Assessment Report for Existing Nonresidential Buildings is a deliverable under Task 2.2 of Agreement 400-10-002. This report summarizes findings from interviews of 20 industry experts to assess the current state of existing energy efficiency efforts in California's nonresidential building sector. The scope of this report encompasses energy efficiency programs, rating systems, energy performance disclosure regulations, financing, workforce development, and outreach.

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TABLE OF CONTENTS

Introduction

Assembly Bill (AB) 758 (Skinner, Chapter 470, Statutes of 2009) requires the California Energy Commission (Energy Commission) to develop a comprehensive statewide program (AB 758 Program) to achieve greater energy efficiency in California's existing residential and nonresidential buildings.

The bill states that the AB 758 program may include, but need not be limited to, a broad range of strategies, including energy assessments, building benchmarking, energy ratings, cost-effective energy efficiency improvements, public and private sector financing options, public outreach efforts, and green workforce training (key AB 758 Program topic areas).

The development of the AB 758 Program is currently in Phase I of a three-phase plan, which is illustrated in Figure 1. The Energy Commission selected PECI to lead a team of firms to provide technical support (Technical Support Team) to aid in the development of the AB 758 Program. This team comprises 12 firms with expertise in all aspects of the residential and nonresidential building markets, as well as subject matter expertise on the key AB 758 Program topic areas.

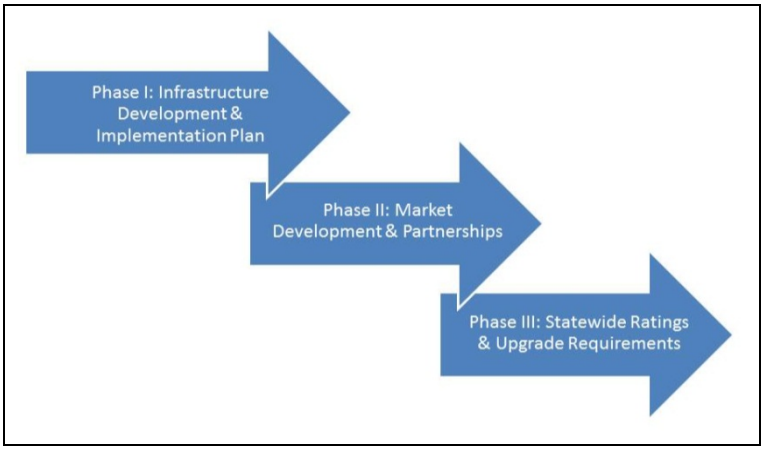

Figure 1: AB 758 Planning and Implementation Phases

Given the broad set of topic areas, a highly diverse set of building types, and a vast multi-climate state, developing a comprehensive energy efficiency program is a highly complex undertaking. However, given the state's aggressive energy and carbon reduction goals and the opportunity to stimulate the state's economy, there is a high level of urgency in developing the AB 758 Program. In response, the Energy Commission designed a needs assessment approach to rapidly gather industry perspectives on energy efficiency in California so as to support Phase I activities.

This needs assessment report draws upon the expertise of industry experts to identify some of the significant issues, barriers and potential solutions for achieving greater energy efficiency in existing nonresidential buildings (a separate needs assessment was conducted relative to the residential market). The outcomes of this research fed into the development of the Comprehensive Energy Efficiency Program for Existing Buildings Scoping Report (Brook, Martha, et al. 2012) (Scoping Report), created by the Energy Commission. The Scoping Report combines the needs assessment interview outcomes with the expertise and experience of staff at

the Energy Commission and the California Public Utilities Commission (CPUC), supplemented with research reports and other industry resources. The Energy Commission also incorporated lessons learned from the AB 758 pilots conducted between 2010 and 2012,[1] funded through the American Recovery and Reinvestment Act (ARRA).

The Scoping Report was the subject of a two-day public workshop in October 2012, which was followed by an open period for submission of written public comments. The needs assessment, Scoping Report, and public consultation all contribute to the Energy Commission's ongoing development of a comprehensive AB 758 Action Plan (which will be the subject of further public workshops in 2013).

The findings in this report are the product of in-depth phone interviews conducted by PECI with nonresidential building sector experts, designed to ascertain level of awareness of and concern for energy-related aspects of building performance, as well as capturing market actors' articulation of the market needs and potential solutions for improving the energy efficiency of existing buildings.

[1] See http://www.energy.ca.gov/ab758/pilot-programs.html for more details on AB 758 pilots.

Purpose

PECI conducted this needs assessment to support the Energy Commission's implementation of Phase I of the AB 758 Program: Infrastructure Development and Implementation Plan. To complete this phase, Energy Commission staff will draw on their own deep expertise and experience across the key program topic areas, as well as the expertise of the staff of the CPUC, and upon a vast resource of published research and other resources. In addition, Energy Commission staff can incorporate the lessons learned from the AB 758 pilots conducted between 2010 and 2012.

Energy Commission staff recognize the efforts of energy efficiency program implementers, building owners, contractors, researchers, public sector employees, engineers, building assessors, and other market actors in maintaining California's leadership position on energy efficiency. Through this needs assessment, PECI gathered valuable insights from experts in these disciplines that would provide fresh perspectives on the issues that Energy Commission staff are looking to address.

Given the breadth and maturity of the energy efficiency industry in California there are many thousands of industry actors who could provide useful insights for development of the AB 758 Program. However, the need to move rapidly and cost-effectively through Phase I of the program necessitated a streamlined method of collecting industry input. Thus, Energy Commission staff determined that interviews with a small group of industry experts and opinion leaders would provide deep insights and perspectives to help in developing the Scoping Report and Action Plan (with broader input coming through public workshops).

The primary purpose of the needs assessment was to explore market needs related to the key AB 758 Program topic areas. The result of this needs assessment (this report) is a broad picture of the state of the nonresidential buildings market in California, as seen through the observations and experiences of selected industry experts and opinion leaders. The research also sought to ascertain the level of public awareness of and concern for energy-related aspects of building performance.

Research Methodology

PECI collected data for this needs assessment through guided interviews with industry experts and opinion leaders on the key AB 758 Program topic areas.

Industry Expert Selection and Recruitment

PECI interviewed industry experts for this needs assessment. These interviewees were selected based on their experience with energy efficiency in general, as well as very specific expertise in the key AB 758 topic areas. Of the final 20 experts interviewed, five were based in southern California, three were based outside of California (chosen due to their deep subject matter expertise which was not region-specific), and the remaining interviewees were based in central or northern California. Interviewees were highly experienced and/or held senior positions within companies.

Interviewees represented the following roles: Real estate owners and managers, city and county officials, contractors, organized labor, commercial real estate agents, engineering firms, university officials, school districts, nonprofit agencies, building commissioning practitioners, and facility maintenance services firms.

Survey Instrument and Interviews

PECI developed an interview guide for use in collecting information from interviewees that covered the following areas:

- Energy efficiency financing
- Energy rating systems
- Energy use disclosure and legislative mandates
- Workforce development
- Energy efficiency improvement programs
- Building science and technology
- Public outreach and other factors driving market demand for energy efficiency services

Within each of the main topic areas, primary questions and subtopics provided for detailed questioning of each interviewee on their area of expertise. The interview guide was approved for use by Energy Commission staff, and is included in Appendix A.

PECI conducted guided interviews using one interview guide for all interviewees, though not all subjects answered all questions at the same level of depth or completeness due to their differing perspectives and areas of experience. Interviews were conducted by asking open-ended questions, and the interview guide provided additional prompts in case interviewees needed clarification on the question or requested options from which to select.

Interviews were conducted between October and December 2011. In some cases, PECI requested additional information by email and phone if clarification was needed on interview responses.

Analysis of Interview Data

Individual interview data was transcribed and organized by topic area. Data for each topic area was reviewed by PECI to identify common themes relating to market needs as well as statements that indicated commonly-held perceptions regarding energy-related aspects of building performance.

Although each interviewee had 'primary' areas of expertise (e.g., workforce development), the guided interview format allowed freedom for discussion across a range of topic areas. In analyzing each interviewee's comments, PECI gave appropriate consideration and weighting for comments made within each interviewee's primary area of expertise.

For each topic area, PECI derived a summary of key needs and recommendations from a combination of direct comments from interviews and inferences made by synthesizing statements made by multiple interviewees. In developing this report PECI has not prioritized needs and recommendations, but in some cases it is noted where interviewees themselves held a strong personal belief of what was most needed.

Findings

The findings from PECI's interviews encompassed the current market status, definition of needs, and discussion of potential means of addressing barriers to greater energy efficiency for existing buildings. The summaries below provide an overview of the interview findings, divided into the following key AB 758 topic areas:

- Investing in Energy Efficiency Improvements
- Workforce Development
- Energy Efficiency Rating Systems
- Energy Rating Disclosure Programs
- Energy Efficiency Improvement Programs
- Energy Efficiency Technologies, Research & Development (R&D)
- Public Outreach & Other Factors Driving Demand for Energy Efficiency Services

Interviewees highlighted many encouraging initiatives that are ongoing, along with areas considered in need of improvement.

Investing in Energy Efficiency Improvements

Effective investments in energy efficiency require that a property owner has an understanding of how an investment can be justified, how to access financing, and how utility rebates and other incentives can be leveraged to make an investment more attractive. The relative importance of these factors depends on the market sector. Interview findings relating to each of these three factors are summarized below.

Justifying investments in energy efficiency

The experts with the deepest experience in finance strongly believed that increasing building owners' understanding of the direct and indirect benefits of improving energy efficiency is key to motivating them to improve the energy efficiency of their buildings. One real estate expert mentioned the growing body of research quantifying the benefits of increased energy efficiency. One such report is *Doing Well by Doing Good? Green Office Buildings* (Eicholtz, P, Nils Kok. 2010), and other similar reports can be found on the www.buildingrating.org website. The research details the reductions in operating costs, increased property value, increase in net operating income (NOI), increase in tenant occupancy, and increases in rents for more energy efficient properties.

While the research correlating energy efficiency to financial performance of properties was familiar to the financial experts and representatives of Class A office property owners interviewed, each of them believed that the majority of property owners do not have a clear understanding of the benefits of energy efficiency beyond direct energy cost savings. The experts indicated a need to educate property owners on the full range of benefits of energy efficiency, and to develop decision-making tools that can incorporate financial benefits beyond direct energy cost savings.

Another key financial barrier cited by several of the interviewees was the typical lease structure employed for rental properties. The most common lease arrangement – triple net – allocates all

utility costs to the tenant, and this gives rise to a "split incentive" situation whereby the tenant may not be motivated to invest in energy efficiency upgrades because they do not own the building, and the owner may not be motivated because they will not see the direct energy cost savings. One interviewee suggested that the triple net lease need not be such a barrier for owners because energy efficiency can provide significant value beyond the direct energy cost savings received by tenants (see first paragraph of this section). The expert noted that this is currently a minority view, however, and it will take time and education for the commercial real estate market to absorb that understanding into their business practices.

Moving from triple net leases to "green leases" can also contribute to solving the split incentive problem. The main feature of a green lease is that it allocates some or all of the cost savings from energy efficiency upgrades to the property owner. There is no data on how widely green leases are being adopted, and also no accepted definition for what the term entails (although there are some useful resources available such as the Green Leases Toolkit developed by the California Sustainability Alliance[2]). Also, a lease that is not labeled as "green" may still include terms that can be beneficial in promoting energy efficiency. None of the experts interviewed suggested a means of incorporating green leases into the AB 758 Program.

Access to financing

Lack of investment capital was cited as a significant barrier by several of the experts interviewed. One expert indicated that restricted access to capital is particularly problematic for small commercial property owners, who typically have limited resources for investigating financing options and for managing complex investment decisions. The issue of limited capital has been present for many years, but in the current economic downturn this is thought to be especially true. Interviewees stated a clear need for increased levels of financing to meet California's energy efficiency goals.

One financial expert explained that the most critical barrier holding back private financing for energy efficiency is the lack of standardization in underwriting terms for energy efficiency upgrade loans. This increases uncertainty and thus reduces motivation for primary lenders to offer energy efficiency loan products. It also limits the ability of primary lenders to bundle loans and sell them into secondary markets because this is dependent on bundled loans having standard underwriting terms. In order to develop underwriting standards for energy efficiency loans, lenders are seeking more data on the financial performance (e.g., default rates, realized energy cost savings) of loans for energy efficiency upgrades. This need is already recognized at the federal and state level; the U.S. Department of Energy (DOE) and CPUC are both taking steps with the intention of encouraging more private financing for energy efficiency upgrades. One interviewee suggested that private lenders might be more willing to offer loans for energy efficiency upgrades if publicly-funded loan-loss reserve programs could protect lenders in the event of borrower default.

On-bill financing (OBF) and on-bill repayment (OBR) offered through utilities were believed by several interviewees to be a great way to encourage property owners to invest in energy efficiency upgrades. For both OBF and OBR the utility collects loan repayments via the utility bill; for OBF the capital is provided by the utility at zero interest, and for OBR the capital is

[2] More details on the Green Leases Toolkit available at http://sustainca.org/green_leases_toolkit

provided by private lenders with the lender setting the interest rate. OBF has been piloted in California, but has been limited due to restricted utility budgets for providing upfront capital. OBR is a relatively new approach that can overcome that limitation through the use of external private financing, but will have to deal with the general issue that there are no standardized underwriting approaches. One expert noted that OBF and OBR are particularly beneficial for smaller property owners due to their simplicity and the fact that the repayment is collected through the energy bills that they are already paying.

Energy service companies (ESCOs) also can be utilized to install and arrange funding for energy efficiency projects. Services such as the development and design of the upgrade project, the installation and management of the installed equipment, and the measurement and verification of the project's energy savings may be bundled into a project's cost and repaid through the savings generated by the project. ESCOs often operate under a performance-based contract, which links the ESCO's compensation directly to the amount of energy actually saved – this can provide extra assurance to building owners in committing to upgrade projects.

The use of ESCOs was limited among the industry experts we interviewed, and so findings here are general in nature. One expert believed that the Energy Commission should figure out better ways to utilize ESCOs, partnering with them to make energy efficiency projects more accessible throughout the commercial building sector[3]. The use of ESCOs has potential benefit, a leading real estate expert noted, because ESCO contracting arrangements can result in zero debt on the building owner's balance sheet (known as an "off-balance sheet" arrangement). This is highly beneficial to property owners, as it maintains the owner's equity in the property that can be leveraged for other financing purposes. In cases where the ESCO arranges the financing, an owner does not need to use the company's borrowing capacity or provide a personal guarantee. This type of arrangement could be of particular importance to companies that have reached the limit in their ability to carry or obtain any further debt.

One expert believed that using ESCOs results in higher owner costs overall. This seems logical because the ESCO is carrying the financing, credit and performance risks, so the cost charged by the ESCO will be higher than if a building owner is able to obtain financing directly. In general, the ESCO's overhead costs for project management, arranging financing, and measurement & verification mean that it is best suited to larger projects with a longer payback period (e.g., 10 to 20 years), or to owners who have restricted access to financing. The idea of energy efficiency upgrade projects with a payback of ten years or more presents another barrier for commercial building owners who often avoid long term financing arrangements as they do not know how long they will own the property.

[3] Approximately 80% of ESCO business has been for public sector building owners. A major cited reason for this is that, to justify the additional overhead from using an ESCO, projects are typically large capital investments with a long payback period, perhaps 10-20 years. Public sector buildings are typically held for long periods or indefinitely, and so a long payback period is not a major barrier. For the commercial real estate market buildings change hands more often and so there is often a reluctance to take on long-payback projects.

Utility rebates and other incentives

Several of the experts asserted that utility capital investments (usually in the form of rebates) have been successful at improving the energy efficiency of existing buildings in California. While rebates are generally believed to be important drivers toward market uptake of energy efficiency, the interviewees provided several general suggestions on how owner participation in rebate programs could be increased:

- **Flexibility of program cycles:** Representatives of property owners and managers noted that they were not always able to work within a utility's timeframe in order to qualify for a rebate, as project budgetary requirements and timelines do not always align with 3-year utility program cycles. The experts indicated a need for longer program cycles or the ability to have projects overlap between cycles.
- **Long-term program consistency:** One energy consultant noted that, over time, program rebate amounts vary and the conditions that trigger the ability for a building to participate in a program vary. The respondent suggested that reducing program variability and inconsistency over time could increase owners' interest in utility programs.
- **Improved program outreach:** Some of the experts noted that larger property owners who retain energy managers were in a better position to research the wide array of available utility programs. However, small to mid-sized property owners were believed to be unable to dedicate the required resources necessary to learn about available programs. Improved, focused outreach could help small to mid-sized property owners navigate the available utility program options.

In addition to utility rebates, federal tax incentives were also discussed by some of the interviewees. Internal Revenue Code Section 179 (d) allows for an immediate depreciation deduction of up to $1.80 per square foot for commercial buildings that achieve a 50% reduction in total energy and power costs, relative to ASHRAE 90.1 building standard (ASHRAE. 2010). Documentation requirements are onerous, though, thereby favoring owners with large portfolios who may have energy managers and tax professionals on staff (there are ongoing efforts at the federal level to simplify documentation requirements).

Among the experts interviewed, awareness of credits available under the 179(d) program was limited. One industry expert noted the lack of familiarity with the program that existed even within tax departments of large companies.

Workforce Development

The interviews carried out for this report identified needs relating to how workforce education is aligned and coordinated, and in some cases identified specific areas where skills are lacking. Three of the experts interviewed by PECI had deep knowledge of training related to construction trades in California; some of the other interviewees provided perspectives related to their own market segment or profession.

Definition of "green" workforce training

The term "green job" was considered to be something of a misnomer by interviewees – it is believed that the vast majority of workforce skills needed are within the traditional construction

trades, and skills upgrade training can support those tradespeople in performing high quality energy efficiency improvements. It is believed that creating a distinction between "green" and "non-green" jobs can lead to a disconnect between so-called green job training and other pre-existing training venues for traditional construction trades. All three of the interviewees with deep experience in workforce development voiced concern that the concept of a green job gives rise to the idea that standalone green training programs are a solution for bringing new workers into energy efficiency-related jobs. They believed that this has led in some cases to short and focused training programs that do not produce a well-rounded skill set and good career prospects for training graduates. The point being made was that there needs to be increased recognition that basic technical education and experience should be a prerequisite for more specialized work relating to energy efficiency upgrades.

Aligning statewide workforce training efforts

Apprenticeship programs were considered by several interviewees to be valuable core workforce-training programs. Interviewees stated that programs are well-resourced, target the trades who constitute the majority of the workforce needed for energy efficiency projects, and are also configured so that workforce supply is well balanced to demand. Much of the workforce interviewee discussion was centered on how other educational avenues could be better aligned with the apprenticeships (e.g., high schools, community colleges, and universities). The phrase used to describe this by more than one interviewee was "functional alignment." Functional alignment does not necessarily define a strict path from high school through to a fully qualified and experienced tradesperson, but may help to ensure that, for instance, a community college graduate can start an apprenticeship with the required reading and mathematical knowledge, along with basic hands-on experience. In particular it was recommended that community college training should include more hands-on experience and perhaps a work placement period – one interviewee commented that the community colleges could be considered as a form of "pre-apprenticeship."

The California Advanced Lighting Controls Training Program (CALCTP) was suggested by several interviewees as an example of best practice in training.[4] This 40-hour training and certification program provides specifically targeted skills to address common lighting controls installation problems. Interviewees referred to CALCTP as a "journey-level upgrade" approach, meaning that there is a high level of prior experience and education required in order to take the course ("journeyman" is the term used for those who have completed a trade-related apprenticeship). The collaborative development approach between the Energy Commission, utilities, unions, the California Community College System, and industry associations was lauded by interviewees, along with the hands-on elements of the training. Interviewees suggested that the CALCTP approach could be transferred to other areas where skills gaps exist, such as installation of building automation system controls, sub-metering, advanced energy monitoring, demand control ventilation, and thermo graphic analysis of HVAC systems. In addition to interviewee responses, a 2011 workforce needs assessment report proposed some additional areas that might also benefit from this approach: New forms of energy storage, integrated demand-side management, and building benchmarking (Zabin, C et al. 2011).

[4] More details on CALCTP available at https://www.calctp.org/

Forecasting workforce needs

Forecasting workforce development needs, both the skills required and workforce growth, varies by region. Ideally this forecasting is a collaborative effort between both the supply and demand side of workforce development, and the planning process itself requires a specific skill set. One expert noted that there are some individuals and firms who are identified leaders in this planning and forecasting discipline, and that there is a general need to raise the consistency and skill level of individuals performing this forecasting across all regions in the state.

On a statewide basis, a recent report suggested that projected workforce growth related to energy efficiency through 2020 could be satisfied through re-employment of tradespeople who are out of work as a result of the recent economic recession (Zabin, C et al. 2011). The report's findings point to a greater need for energy-related skills upgrade training as opposed to increasing the throughput of basic training programs for tradespeople.

Workforce certification and standards

It was recommended by interviewees that the state review the different workforce certifications currently available, and develop policies to encourage greater adoption. One interviewee gave an example of requiring specific certifications for state-funded projects. It was also suggested that the state work with certifying bodies to increase certification standards in ways that would support long-term improvement in the quality of energy efficiency upgrades. This kind of coordination would have beneficial outcomes such as linking certification and training to the skills required to meet replacement equipment efficiency requirements in increasingly stringent building codes.

One interviewee suggested scrapping 'licensing for life' for contractors, instead requiring contractors to re-certify periodically, tied to training, exams, and/or continuing educational credits. This would not only increase general skill levels, but would provide a regular intervention point for integrating training on new technologies and updated building codes.

When discussing certification, most interviewees also raised the related topic of standards. Linking certifications to standards of work are considered an effective mechanism for increasing the quality of energy efficiency upgrades. One such example is the ANSI/ACCA/ASHRAE 180-2008 Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems (ANSI/ACCA/ASHRAE. 2008). This has been incorporated into utility programs by SCE and PG&E, whereby contractors undergo training in the Standard and then become qualified to offer incentivized maintenance services through the program. These programs are currently going through their first utility program cycle so have not been evaluated by a third party, but the concept of linking training, certification, and standards within a programmatic framework may be applicable to other areas relating to energy efficiency.

Specific skills needs

Building commissioning was an area highlighted by two interviewees as needing greater consistency, with two specific suggestions provided. First, there is a need to work with the multiple commissioning training and certification bodies to assess the current workforce in California and identify skills gaps. Second, operator skills training programs such as Building

Operator Certification[5] could be enhanced to enable operators to better engage in the commissioning process and maximize persistence of savings after the commissioning project is completed.

Interviewees suggested a number of specific training needs in California related to energy efficiency (in each case the suggestion was made by just one of the interviewees). The following list of training needs is not exhaustive, but provides an indication of some areas of need indicated by the experts interviewed: energy auditor training; energy modeling training for design professionals; training for building operators on the operation of building automation systems (BAS); training for engineers on how to program BAS to optimize energy performance of HVAC systems; training on building enclosure commissioning; technical training for building code officials; building code-related training for equipment installers; sales training for contractors; training for property appraisers to factor a building's energy efficiency into its valuation (this would also require efforts to develop appraisal standards).

Energy Efficiency Rating Systems

There are two fundamental types of energy efficiency rating applicable to nonresidential buildings:

- **Energy use rating:** A metric to quantify a building's energy use characteristics relative to an appropriate peer group (e.g., similar building type in a similar climate). The metric could be self-explanatory (e.g., energy use per square foot per year) or an indexed value (e.g., a score on a scale of 1 to 100).
- **Energy asset rating:** A metric to describe the inherent efficiency of a building's permanent equipment, construction, and design features. An energy asset rating indicates the energy efficiency of the building if all equipment is operated under standard conditions; it does not attempt to predict actual energy use of a building, which can be very dependent on the behavior of the occupants and operators.

In the U.S., ENERGY STAR® Portfolio Manager (ENERGY STAR) is the most commonly applied energy use rating system, scoring properties on a scale of 1 (worst) to 100 (best).[6] Achieving an ENERGY STAR score of 75 or greater signifies that a building is within the top 25% for energy efficiency among similar building types, and qualifies a building to carry the ENERGY STAR label.

There is currently no energy asset rating available in the U.S. although the U.S. DOE and the Energy Commission are each developing asset ratings. The Energy Commission is in an early stage of development of the Building Energy Asset Rating System (BEARS). At the time of the needs assessment interviews, little information on BEARS had been released publicly.

[5] See http://www.theboc.info/ for more details on the Building Operator Certification Program

[6] ENERGY STAR ratings can be obtained via the Energy Star Portfolio Manager program. More details at http://www.energystar.gov

The U.S. Green Building Council's (USGBC's) Leadership in Energy and Environmental Design (LEED) rating system is neither an energy use rating nor an energy asset rating, though it is a well-recognized building label that incorporates some energy-related elements. LEED is based on a point-scoring system whereby building owners have to meet certain prerequisites and then earn points for a wide range of sustainability-related features. Attaining an ENERGY STAR score of 69 is a prerequisite, and additional points can be earned for higher scores.

The potential impact of BEARS

Many of the experts noted that LEED and ENERGY STAR ratings have gained significant market penetration across the U.S. The general view among those that commented was that a new rating system would have to differentiate itself from LEED and ENERGY STAR with information of value to an owner, tenant, or party to a transaction involving a nonresidential building. One interviewee suggested that an energy asset rating could be a useful tool for evaluating comprehensive packages of retrofits (e.g., that achieve greater than 30% energy savings) without the need for costly energy simulations. The same expert also suggested that if energy asset ratings could help building owners to distinguish design potential from actual building performance it would be very beneficial.

Several experts noted that careful thought is needed to clearly communicate the value of a BEARS rating to a building owner or tenant. It was recommended that the BEARS rating indicate the full range of performance potential and clearly indicate the gap between the rated building and a high performance building. While comparing a building's rating to a 'typical' building would be of interest to building owners, it was asserted that California's energy efficiency goals would be better-served if the rating placed more emphasis on comparison to a high performance building.

One provider of building commissioning services considered how a new rating system would impact his business: many commissioning providers also offer services to help building owners obtain an ENERGY STAR rating or manage the LEED certification process. The interviewee was unclear on what business development opportunity might be available to them through the introduction of BEARS. A similar sentiment was expressed by a representative of a facility maintenance services firm, who was unclear on how he would 'sell' an energy asset rating to his clients.

When asked if lenders might have different needs than owners when considering the design of a rating system, two real estate professionals indicated that it would be surprising if a lender found any ratings relevant to a real estate transaction. The extent to which this statement is true among the lending industry has not been validated, but there are resources that do indicate interest in sustainability from institutional investors (the Global Real Estate Sustainability Benchmark[7] being one example).

Consistent criteria

Several industry experts familiar with LEED and ENERGY STAR noted that both of those rating systems have evolved over time with changing parameters and criteria. Those changes impact

[7] The GRESB Foundation is a member-led organization that is developing tools for assessing the sustainability performance of real estate portfolios. More details at http://gresb.com/home

building scores, potentially necessitating extra effort/cost and causing confusion for property owners. While there is an appreciation that changing parameters may be required, it is something that is believed to create challenges for building owners. The interviewees identified a need for long term consistency in criteria for developing energy efficiency ratings.

Cost of obtaining a rating

One major hurdle for any nonresidential building rating is the up-front cost of obtaining the rating. This is especially true for new rating systems where there may be no immediate value in having a rating, because it can take many years for the financial/market benefits of obtaining a rating to be demonstrated. One interviewee recommended investing in simple tools and minimizing the labor input required to collect input data for the rating, to minimize upfront cost. Several interviewees commented that combining BEARS data collection effort with another business activity (such as benchmarking or an energy audit) would result in only an incremental cost for the rating, which would be easier to sell to building owners.

One small property owner cautioned against being driven solely by cost, however. He commented that he had never spent less than $7,000 on a property appraisal, and so would not trust the reliability and integrity of a BEARS rating if it was very low cost (e.g., for a few hundred dollars).

A rating cost that is too high would be expected to have an adverse impact on market penetration and willingness of owners to voluntarily rate their buildings. Conversely, a cost approach that is too low and not technically rigorous will have limited value. The qualitative nature of the expert interviews did not provide direction towards setting an optimal cost target.

Providing recommendations for improvements

One commercial real estate expert asserted that the value of an energy asset rating to a building owner would be in any recommendations for actionable steps toward greater efficiency. This could be of immense benefit to owners, in particular smaller companies who are often unsure what steps to take to improve energy efficiency and do not have resources to investigate a wide array of options. The interviewee noted the need to maintain a focus on improving energy efficiency as the end goal as opposed to ratings being the end goal. Another real estate professional thought there would need to be a direct economic benefit for someone to want to obtain a BEARS rating.

While it is not essential that the BEARS rating itself incorporates recommendations for efficiency improvements, the expert feedback indicates that the rating needs to be considered as part of an overall package that includes recommended next steps.

Achieving market acceptance for BEARS

A property manager indicated that a major factor in achieving scale in acceptance of ratings is to help make building stakeholders' jobs (e.g., building management, engineering, and operations staff) easier. This should be considered as a direct or indirect impact of an energy asset rating, and also applies to other related AB 758 Program elements such as energy use monitoring, commissioning, efficiency programs, or BAS upgrades.

While opportunity exists to create a meaningful building energy use rating system for commercial buildings, experts cautioned that it is important to remember that the end goal of an energy use rating system is to support and create demand for more energy efficient buildings,

and not only to differentiate a new energy use rating system from others already in existence. Outreach messaging and education will be necessary to achieve market acceptance of new energy asset ratings, as well as informing how energy asset ratings can be used by owners in partnership with an energy use rating to encourage investment in energy efficiency and increase demand for more energy efficient buildings.

Energy Rating Disclosure Programs

Disclosure of a building's energy performance is being incorporated into public policy programs nationwide. In California, this has been seen in the implementation of AB 1103 (Saldaña, Statutes of 2007)[8] and in the City of San Francisco's Existing Commercial Buildings Energy Performance Ordinance (2011).[9] Both of these programs, and the majority of others coming into existence nationwide, are built around disclosure of a building's ENERGY STAR score. Development of BEARS will provide a new rating approach for property owners, and enable California asset rating disclosure.

When to require disclosure of energy performance, by whom, and to who are highly sensitive topics, as was seen in the expert interviews. There was no clear consensus on the appropriate disclosure methodology, but there was broad agreement that disclosure program development needs to be collaborative and implementation should be phased. One interviewee suggested that the Energy Commission needs to come to agreement with property owners on how obtaining and disclosing a rating will add value in the nonresidential property market.

Implementation approach for disclosure regulations

As one expert noted, the most common model for encouraging action has been to 1) educate and recognize very early adopters of a technology or a practice, 2) establish an incentive for that technology or practice, 3) require that technology or practice in government facilities, and 4) establish an obligation that relates to all or most facilities.

To a large degree, this has been the case with disclosure of ENERGY STAR ratings (such as AB 1103), as there was already significant market penetration for ENERGY STAR rating prior to the implementation, and significant support from utilities in making the utility data collection process as easy as possible.

One real estate expert highlighted a need to identify and serve hard-to-reach markets when launching a disclosure program. The interviewee specifically mentioned "mom and pop family holdings" and minority ethnic groups as needing careful attention so that they fully understand requirements and have the resources to meet disclosure requirements. Chambers of Commerce were proposed as a possible option for reaching these groups.

One real estate expert suggested how the forthcoming BEARS rating could complement the practices mandated through AB 1103. The interviewee noted that AB 1103 was already law and

[8] More details as http://www.energy.ca.gov/ab1103/

[9] More details at http://www.sfenvironment.org/our_programs/interests.html?ssi=6&ti=14&ii=208

is a valuable educational opportunity for reaching property owners. BEARS first could be promoted as a voluntary option that is complementary to AB 1103 Energy Use Ratings. It was suggested that information on ENERGY STAR, BEARS, and other AB 758 Program resources could be summarized in outreach materials distributed in conjunction with any commercial property transaction.

Two interviewees highlighted the challenge that many property owners are resistant to any kind of policy mandate (such as mandatory disclosure of energy ratings), with one real estate expert suggesting that policymakers sometimes burden all property owners with mandatory requirements when the goal should be to target those property owners who are not investing in energy efficiency upgrades. This same expert thought that policymakers should not allow "the perfect to be the enemy of the good," recommending that policies should be rolled out on a gradual basis, and that owners who are taking leadership on sustainability should be allowed sufficient freedom in how they achieve it.

Time-of-sale vs. date-certain disclosure

Although most of the experts believed that a time-of-sale disclosure was problematic, clear agreement does not exist as to an alternative optimal time for disclosure. The City of San Francisco chose a "date-certain" approach to their disclosure regulations[10] (date-certain meaning that specific dates were set for requiring disclosure as opposed to time-of-sale). A finance expert proposed time of refinancing as an alternative, indicating that there are so many critical elements/steps in a property sales process that there is a risk that energy efficiency will not feature as a priority for decision-makers.

The concept of an energy asset rating is often discussed in relation to time-of-sale because it is a way of objectively assessing the value of a building's assets in relation to energy efficiency, and this information is expected to be valuable to the parties involved in the transaction. All of the experts in the real estate and owner/property manager groups indicated that time-of-sale is a very sensitive period. Lenders are not sympathetic to delays in a property transaction that might occur when trying to obtain mandatory disclosure information. Real estate professionals do not want to be responsible for managing additional information; they strongly believe that the role of the real estate professional is to facilitate the sale and to best represent the buyer and seller, rather than enforce state energy policy. Another drawback of time-of-sale disclosure that was mentioned is that it is hard for the state to track data on transactions at the state level as the process is typically recorded at the county level.

Another commonly-cited argument for time-of-sale rating is that property value is most commonly assessed when an asset is sold. One finance expert noted, however, that real estate investment trusts (REITs) value their properties on a daily basis. The interviewee estimated that REIT-owned properties account for 20-30% of the commercial property market, and that in addition to REITs there is "a pretty big segment of the marketplace that values on a quarterly basis." This is a key point in relation to disclosure requirements, and is worthy of deeper consideration. The two main areas of additional inquiry would be 1) how is periodic (e.g., daily,

[10] Requirements are defined in the Existing Commercial Buildings Energy Performance Ordinance, 2011. Details at http://www.sfenvironment.org/our_programs/interests.html?ssi=6&ti=14&ii=208

quarterly, etc.) valuation conducted and 2) how might an energy efficiency rating factor into that valuation process?

A real estate expert emphasized the point that the end goal – improving energy efficiency – might be better served if disclosure occurred on a date-certain basis, separate from a sales transaction. The interviewee believed that this would provide a potential benefit for all property owners and state energy efficiency goals, as it could highlight opportunities that might otherwise remain unknown until the property is sold.

Public disclosure (as opposed to disclosure only between the buyer and seller in a transaction) was favored by a few of the experts. Several others believed that public disclosure does not need to occur given that it has not been required for some disclosure programs (San Francisco and Seattle regulations being two examples). One property owner representative suggested that public disclosure could be counter-productive in terms of motivating owners to improve energy efficiency, and there have been many other successful methods of promoting efficiency upgrades.

San Francisco's Existing Commercial Buildings Energy Performance Ordinance

A key factor in the development of San Francisco's Existing Commercial Buildings Energy Performance Ordinance was the formation of the city mayor's cross-functional Taskforce on Existing Commercial Buildings, with representatives from the city, building owners and managers, architects, engineering firms, lawyers, financiers, the Energy Commission, Pacific Gas & Electric, and other industry stakeholders. The Taskforce released its final recommendations in December 2009 (Mayor's Task Force on Existing Commercial Buildings , 2009); these recommendations went beyond disclosure policy, by covering many other efficiency-related topics such as a green tenant toolkit and mandatory sub-metering.

It is worth noting that while San Francisco's program has illustrated a successful collaborative development process, at the time of the needs assessment interviews it was too early to draw any conclusions regarding its adoption. The initial deadline for submitting benchmark data was set as October 1, 2011, and outreach efforts to raise awareness of the requirements were still ongoing at the time of the needs assessment interviews.

A major challenge for cities in implementing disclosure policies is having sufficient resources to manage implementation. As one expert noted, the only organization with enough scale to comprehensively deal with energy efficiency issues is the federal government, or perhaps the state government. He noted that cities must design programs using as few resources as possible to achieve the end goal.

Energy Efficiency Improvement Programs

As noted earlier in this report, the interviewees who expressed opinions on utility programs generally agreed that they are a valuable driver towards increased energy efficiency for existing buildings. Interviewees made a number of suggestions to increase penetration and effectiveness, including longer program cycles, greater consistency in requirements, and improved communication.

None of the interviewees had deep and longstanding experience working with utility programs, nor were they experts on the full range of programs offered throughout the state. As a result the findings under this topic area are general in nature.

Consistency of program requirements

As was mentioned in the context of investing in energy efficiency improvements, the lack of consistency of utility program requirements and incentive levels over time has caused some frustration in the marketplace. One interviewee indicated cases where property owners no longer consider utility program options because they do not want to have to "re-learn" the changing program rules and requirements. It was implied that utilities need to convey and communicate program consistency long term.

Utility program outreach

The question of where to target outreach for utility programs was a topic raised by several of the interviewees, including how to best use service providers as program outreach mechanisms. Many contractors may be recruited and enrolled as program trade allies; however, there may be a large number of other service providers who are not targeted but who can be advocates for programs. This population may encompass equipment vendors and providers of facility maintenance services. One representative of a facility maintenance services firm reported that if he was made more aware about utility program offerings, his firm would take full advantage by promoting them among his clients.

Another interviewee suggested that the most resource-efficient way to reach a broader audience for utility programs was via smarter web-based offerings. The interviewee suggested that software be developed that provides a very brief survey for users which then leads them towards program-specific information based on the initial responses. It was suggested that expanding the Energy Upgrade California (EUC) statewide web portal to include more nonresidential program information might be one good option.[11]

Program requirements relative to Title 24, Part 6

One contractor noted that utility rebate programs for the commercial market are not effective for many buildings fewer than 50,000 square feet. He indicated that, in his experience, owners of these smaller buildings would like to replace older, inefficient systems to meet current Title 24 building standards but program incentives are not available unless improvements go beyond current code requirements.

The interviewee suggested that, with each successive increase in code requirements, the owner of an old building may be looking at an even greater investment for installing new equipment to code, and might therefore have increased motivation to keep repairing old inefficient equipment. The contractor suggested that regulators need to review code baseline requirements relative to utility program eligibility, and consider offering incentives to owners that make improvements to meet (but not necessarily exceed) code requirements. The CPUC 2013-14

[11] Energy Upgrade California (EUC) is the statewide energy and water efficiency and renewable energy generation upgrade program. It is predominantly focused on single family homeowners, although some counties offer multifamily and small commercial options. More details available at: https://energyupgradeca.org/overview

Energy Efficiency Portfolio Guidance Decision (released after the needs assessment interviews) acknowledges this need and directs CPUC Staff, with input from utilities and "other parties," to develop recommendations on utility program baseline requirements[12].

Demand response

Only one interviewee, a representative of a leading property owner, made any mention of demand response.[13] In this particular case, the interviewee's firm is exploring sophisticated energy tracking tools that could interface with the smart grid, and are positioning themselves to take maximum benefit from demand response programs.

Existing building commissioning

Employing holistic approaches for energy efficiency programs was one of the themes explored with the experts interviewed. Existing building commissioning[14] (EBCx) is one program approach that has been employed by the utilities for this purpose, having been piloted in 2004 and scaled up across all IOU territories in subsequent program cycles.

General comments were made by several interviewees regarding the challenges of having to deal with 3-year program cycles, and this challenge is most pronounced for EBCx programs. EBCx projects typically take 12-18 months to complete, and so a 3-year program cycle does not allow much time for program design and recruitment of project sites. There was a stated need by several interviewees to increase the length of utility program cycles to accommodate the long timelines need to implement large scale, holistic, often multiple-phase building improvements.

Aside from the challenge of the utility program duration, one interviewee urged the utilities to consider more of an "ongoing commissioning" approach, rather than thinking of commissioning as a discrete one-time intervention. In the expert's opinion, this may require greater upfront investment in submetering[15] and optimizing data collection, but may provide

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[12] D 12-05-015. May 10, 2012. P350. Available at: http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/166830.htm#P64_821

[13] Demand response programs offer incentives to businesses that volunteer to participate by temporarily reducing their electricity use when demand could outpace supply. In California this typically means reducing electricity use during periods of extremely high outdoor temperatures, by adjusting building equipment settings in a way that has little or no impact on occupant activities.

[14] Existing Building Commissioning (EBCx) is a process of holistically investigating the operation of a building's systems and developing recommendations (with cost and benefit data) that will restore building operations to meet the owner's requirements (and in most cases reduce energy consumption). Upon implementation of improvements, commissioning providers will verify that building systems are operating as intended. More details at www.cacx.org

[15] Submetering is the implementation of hardware (and often software) for the purpose of obtaining energy use data at a higher resolution than whole building energy use. Submetering can encompass a specific space within a building (e.g., the space occupied by a particular tenant), or it can encompass the whole building energy use for a specific end-use system (e.g., lighting). Submetering facilitates improved management of energy use in a building, by allowing for deeper analysis of how and where energy is used

longer-term benefits such as persistence of savings and higher motivation to make future upgrades.

One expert suggested a need for utilities to place more focus on the non-energy benefits that buildings realize as a result of participation in energy efficiency programs. The interviewee noted that providing energy information systems (EIS) and other tools to support programs could "help building owners, managers, and operators do their jobs easier," and that this could provide greater motivation to participate in programs. A commercial real estate representative echoed a similar sentiment, saying that they had performed EBCx and although it was not cheap it provided very useful information to help them manage their buildings' operation.

Mandating energy efficiency upgrades

In California the only mandatory nonresidential energy efficiency upgrade program is the City of Berkeley's Commercial Energy Conservation Ordinance (CECO), which has been in place since 1994. The CECO requires property owners to make a minimum level of energy efficiency upgrade investment at the time-of-sale or at a major renovation.

While none of the interviewees commented on the CECO specifically, the general topic of mandatory energy efficiency upgrades was discussed with the experts as a possible means of improving the energy efficiency of existing buildings. Several interviewees suggested that mandatory upgrade programs are worthy of consideration, but that the program needs to provide incentives to support the upgrades. The potential mechanisms and requirements for mandatory upgrade provisions were not addressed in any of the expert interviews.

Public Outreach and Market Demand for Energy Efficiency

Among the experts interviewed, none was selected specifically as an "outreach expert," but each could provide insights on outreach and public attitudes towards energy efficiency from the perspective of their own industry.

Finding reliable information on energy efficiency

All of the experts interviewed acknowledged the challenge in keeping up with news and best practices on energy efficiency, as there is such a vast array of resources available. This challenge is compounded by the fact that high quality technical research is often not well publicized, while technology vendors are very effective at promoting their own products through self-funded white papers and reports.

Several interviewees commented that large property owners and management firms often have full-time energy managers and/or other staff devoted to improving building performance. These people can research technology options, network with peers, attend conferences, and manage procurement of energy upgrade services. These firms also benefit from having a network of trusted advisors with whom they have built long-term working relationships (e.g., contractors, architects, commissioning providers, facility maintenance service providers). Smaller property owners typically do not have the staff or resources for all of these activities, and therefore have an even greater barrier to getting the information they need to research, select, and implement successful energy upgrades.

One interviewee commented that proper selection of the person delivering a message promoting energy efficiency is often as important as the message itself. This is reinforced by anecdotal evidence that case studies published by property owners are highly influential among their peers. When targeting specific industry stakeholders, it was suggested that the Energy Commission consider who would be delivering the message, and the level of credibility they will have among the target audience.

Market segmentation

Nearly all the experts acknowledged that there is wide variation within the nonresidential market in terms of sophistication, resources, core business, and ownership/management structure. The general message received from many of the experts was that simple market segmentation by building size and/or business type can ignore many factors that impact an owner's ability to become more energy efficient. There is a need for a more sophisticated market segmentation approach that accounts for various market actors' concerns, barriers, and motivations relative to energy efficiency.

Impact of ownership type and investment strategy

There is a need for the Energy Commission to consider ownership type and investment strategy when developing outreach for owners of rental properties. For tenant-occupied buildings the impact of lease terms on energy efficiency potential has been covered earlier (potential for a split incentive scenario). Another key factor is the owner's investment strategy. One service provider noted that different types of owners will have different strategies for managing and valuing properties, as well as a general strategy for how long a property will be owned. For some, the building itself is merely an investment vehicle, and they may have little or no direct interface with the day-to-day operations or energy bills, other than in seeing how those parameters show up on cash flow accounts. All of these factors will affect owners' receptivity to different messaging approaches and their willingness to consider energy efficiency upgrades for their properties.

Small property owners

As noted above, most of the experts believed that smaller property owners do not have the resources or capacity to understand their options related to energy efficiency. More outreach is necessary to help them understand the available options, which can help them significantly reduce energy consumption. One Class A Office owner commented that he hears smaller property owners talking about solar panels or other big project ideas, while being unaware of simple, smaller, more cost effective energy efficiency options.

A contractor voiced a similar sentiment, and added that small property owners typically do not want to take on a monthly payment commitment for financing energy efficiency upgrades. He noted that typically small property owners pay their monthly energy bills without realizing how they can reduce that monthly payment, while resisting financing of energy efficiency upgrades without realizing that investment can have a positive cash flow. The contractor suggested there is a need for outreach to change misperception of energy bills and to increase understanding of how energy efficiency can positively affect cash flow.

Class A office properties

Several interviewees commented that many Class A office owners are implementing energy efficiency upgrades because they are sophisticated enough to understand that it can provide a

competitive advantage and enhance asset value. This group of owners is much more likely to employ an energy manager, either on staff or through a trusted contractor. One interviewee noted that one positive impact of the recent recession was that increased vacancy rates led in many cases to owners upgrading the energy efficiency of their properties in an effort to attract tenants. This comment indicates that outreach on energy efficiency can adapt to and take advantage of market conditions, even when the economy is weak.

Facility maintenance service providers

The commercial office market, one expert indicated, is seeing a trend of shifting the building operations function to outsourced facility maintenance service providers. These outsourced providers often have energy groups, which evaluate new technologies and assess local utility rebates, and can manage energy efficiency upgrade projects. These outsourced providers offer the potential for delivering energy efficiency in two ways. First, they can tap into their own firm's expertise rather than requiring the building owner to expend time and effort assessing multiple outside vendors. Second, elevating the skills of the operators employed by the facility maintenance service provider has the potential to improve building operations across all of the buildings they serve. One interviewee suggested that providing outreach, education and training to facility maintenance service providers may be an opportunity for the Energy Commission to expand the reach of energy efficiency programs.

Energy Upgrade California

One interviewee talked positively about EUC, saying that it offers education, programs, financing resources, and contractor information from a "one-stop" online location. He said that this comprehensive approach can address a need not only for education but also for overcoming other barriers for property owners (such as reducing the effort needed to investigate financing options and to find qualified contractors).

Summary

The needs assessment interviews provided a broad perspective of California's needs relative to the key AB 758 topic areas, through the insights and perspectives of 20 industry experts. Each expert recognized the high degree of complexity in the nonresidential properties market, and the need for a comprehensive approach to increase the energy efficiency of California's existing building stock.

The guided interview format allowed deep exploration of the topic areas most relevant to each expert. This has provided valuable contextual information on the concerns and perceptions of various market actors, and provides many pointers to areas most in need of attention as the state seeks to increase the energy efficiency of California's existing buildings. These findings can help to guide the Energy Commission through Phase I of AB 758 Program development and to anticipate some of the obstacles that lay ahead.

The market needs stated by interviewees for each of the key AB 758 topic areas are summarized below. PECI has not attempted to prioritize the list of identified needs.

Investing in Energy Efficiency Improvements

- Need to educate property owners on the full range of benefits of energy efficiency, beyond energy cost savings, such as increased asset value, net operating income, occupancy rates.
- Need to develop financial decision-making tools for property owners that can incorporate financial benefits beyond energy cost savings (e.g., increase in asset value, net operating income, occupancy).
- Need increased access to financing for a broader subset of nonresidential property owners.
- Need to develop underwriting standards for energy efficiency loans. Need more data on the financial performance (e.g., default rates, realized energy cost savings) of loans for energy efficiency upgrades, to support underwriting standards development.
- Need more flexibility in designs of utility rebate programs, to encourage greater market uptake. Need to reduce variability and inconsistency of utility programs between program cycles.
- Need for improved outreach to help small to mid-sized property owners navigate the wide array of utility program options.
- Need to increase awareness of federal 179D tax depreciation incentives so as to increase market uptake.

Workforce Development

- Need for increased recognition that basic technical education and experience is a prerequisite for more specialized work relating to energy efficiency upgrades.

- Need to ensure functional alignment between training institutions in the state, and define career pathways for workers that provide clarity around how they can progress through multiple training programs.
- Need to increase the level of energy efficiency hands-on training offered through community colleges.
- Need to consider other areas of need to which the CALCTP training/certification approach might be suited (beyond lighting controls).
- Need to raise the consistency and skill level of individuals conducting workforce needs forecasting across all regions in the state.
- Need to review the different workforce certifications currently available, and develop policies to encourage greater market adoption (such as requiring certain certifications for public works projects).
- Need to consider requiring periodic recertification for contractors, with the goal of encouraging ongoing education and training on technologies and building codes.

Energy Efficiency Rating Systems

- Need outreach to clearly distinguish the BEARS rating from LEED and ENERGY STAR, and to communicate the value of BEARS to key industry market actors.
- Need to consider BEARS introduction as part of an overall program package that includes recommended next steps and other useful/actionable information for property owners.
- Need to consider how ratings can help to make life easier for property owners, managers, engineers, and operators, beyond simply providing financial benefits to the business (eg. Ratings can help in understanding and managing building systems, make it easier to evaluate packages of retrofit measures, or make it easier to track building performance over time).
- Need to maintain a focus on improving energy efficiency as the end goal and having ratings be a step towards that goal.

Energy Rating Disclosure Programs

- Need to identify hard-to-reach markets when launching a disclosure program, and develop strategies to address their unique needs ("mom and pop family holdings" and minority ethnic groups were mentioned as examples of hard-to-reach markets).

Energy Efficiency Improvement Programs

- Need to consider expanding nonresidential offerings through the Energy Upgrade California statewide web portal.
- Need to review code baseline requirements relative to utility program savings calculations, to determine if changing the current policy could encourage greater participation in utility programs.

- Need to consider increasing the length of utility program cycles to enable greater throughput of projects (especially projects with longer timelines such as EBCx).
- Need to promote the non-energy benefits of programs more strongly to property owners. Many property owners do not benefit from the direct cost savings (their tenants do), and so their motivations to invest in energy efficiency are often more impacted by non-energy benefits.

Public Outreach and Market Demand for Energy Efficiency

- Need for a more sophisticated market segmentation approach for targeting outreach campaigns, to account for the varying needs and concerns of different stakeholder/business types.
- When targeting specific industry stakeholders, there is a need to consider who would be delivering the message, and the level of credibility they will have among the target audience (e.g., property owners are strongly influenced by their peers).
- Need more education for small property owners on the cost effectiveness of energy efficiency upgrades and how to manage projects.
- Need for outreach to educate business owners that energy efficiency can positively affect cash flow.

Several of the interviewees highlighted California's long history of leadership on energy efficiency issues, noting for example the state's progressive building energy efficiency standards and energy policies. They recommended that the Energy Commission continue to promote the positive outcomes from decades of effort towards increased energy efficiency, and to create a clear set of goals and objectives for future efforts.

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Appendix A: Acronyms and Abbreviations

ARRA	American Recovery and Reinvestment Act
ASHRAE	American Society of Heating, Refrigerating, and Air-conditioning Engineers
BAS	Building automation system
BEARS	Building Energy Asset Rating System
BOMA	Building Owners and Managers Association
CALCTP	California Advanced Lighting Controls Training Program
CPUC	California Public Utility Commission
DGS	[California] Department of General Services
EUC	Energy Upgrade California
EBCx	Existing building commissioning
ESCO	Energy service company
HVAC	Heating, ventilation, and air-conditioning
IOU	Investor-owned utilities (PG&E, SCE, SDG&E, SoCal Gas)
LEED	Leadership in Energy and Environmental Design
M&V	Measurement and Verification
NOI	Net operating income
O&M	Operations and Maintenance
OBF	On-bill financing
OBR	On-bill repayment
PACE	Property Assessed Clean Energy
REIT	Real Estate Investment Trust
R&D	Research and development
U.S. DOE	United States Department of Energy
USGBC	United States Green Building Council
ZNE	Zero net energy

Appendix B: Glossary

Assessment of a building is the process of collecting information on the energy performance of the building and calculating the background for rating. This process may include advice on energy improvements.

Energy Asset rating is a rating where energy performance is evaluated based on a building's construction and installed energy consuming systems.

Energy performance refers to the energy efficiency of buildings.

Energy use rating is a rating where energy performance is evaluated based on a building's actual energy use.

Labeling of buildings is the process of generating an energy label for a building.

Measures refer to the individual actions that can be taken to improve the energy efficiency of a building.

Nonresidential buildings are those covered by the 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings[16], including the following occupancy ratings groups[17]:

- Offices
- Retail and wholesale stores
- Grocery stores
- Restaurants
- Assembly and conference areas
- Industrial work buildings
- Commercial or industrial storage
- Schools and churches
- Theaters
- Hotels and motels

Office building class definitions. Office space is typically grouped into three classes[18], indicating a subjective quality rating of buildings. The subjective class definition is indication of the building's competitive ability to attract tenants with factors such as rent, building finishes, amenities, location, and market perception used as relative measures. This report refers to these class definitions:

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[16] California Energy Commission. *2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.* December 2008. www.energy.ca.gov

[17] For purposes of this AB 758 report, apartment and multi-family buildings are included in the residential category, even though they appear in the Building Standards Commission classification

[18] Building class definitions defined by BOMA International. Boma.org

- Class A is comprised of prestigious office buildings competing for premier office users. Rents are above the area average. Finishes are of high quality
- Class B is comprised of buildings competing for a wide range of users with average rents. Building finishes are fair to good
- Class C buildings compete for tenants requiring functional space, but with rents at a below average rate

Appendix C: Interview Instrument

1 Finance:

1A Practices used to evaluate and implement capital and operational improvements

- What are the most common metrics used by owners to evaluate EE investments? (NPV, IRR, Simple payback, etc.)
- Similar question for lenders?
- How do common practices act to discourage or encourage EE investments?
- Deep retrofits can increase the energy savings while at the same time increase the risk. What policies or guidelines exist for scoping retrofit projects and bounding the risk?
- What or who do owners look to to gain direction on how to evaluate & implement improvements? (Organizations, training, lenders, etc.)
- How do owners and lenders track their investment over time? (e.g., M&V practices)
    - How would you rate the level of success that you have seen with each of these practices?
- What are the implications of using ESCO (Energy Services Company) Services? (Risks; do these services cover most EE retrofit projects, or are they limited?)

1B Tax-related incentives:

- 179D:
    - What is the general perception?
    - Extent of adoption?
    - Barriers to greater adoption?
- Other noteworthy tax-related programs?
- How critical are tax-related incentives in the grand scheme of encouraging EE?

1C Financing options available to consumers and public receptiveness to these options

- PACE Commercial Consortium
    - How best can PACE be promoted, and what are the pitfalls to avoid?
    - What is the initial public reaction?
    - What are the legal barriers that it will face?
- Municipal financing and utility on-bill financing programs
    - On-bill financing
        - How broadly are these offered throughout the state? [various stages of pilot, limited to certain types of retrofit]
        - Have you seen any barriers to adoption? [awareness; over-complication/paperwork; commitment terms; other]
- New tools to finance energy efficiency upgrades
    - What is new, or in the pipeline?

2 Workforce Development:

2A Consistency of various Energy Auditor certification programs

- Perceived problems
    - Among practitioners? 'good' vs. 'poor' standards
    - Among owners? Awareness, confusion
- What are the commonly used audit procedures in your area?
- Is there a need to redefine the commonly used audit procedures themselves?
- How do training programs meet the requirements for different levels for audits?
    - Do training programs differentiate?
    - One size fits all approach?

2B Federally-funded Projects

- Clean Energy Workforce Training (CEWT) programs funded by the American Recovery and Reinvestment Act of 2009 (ARRA)
- Workforce training included in programs funded by the ARRA State Energy Program (SEP) and Energy Efficiency and Conservation Block Grant (EECBG) programs
- What are the successes from the ARRA funded programs, and how could they be continued beyond the ARRA funding period?

2C Other Workforce Development Programs

- Community college training programs
- Professional trade training and apprenticeship programs
- Utility training programs
- Gaps, over-training, or bottlenecks in existing workforce development programs
    - Who should take the lead on training? (Dig into details, one size will not fit all)
    - What are the shining examples that can be emulated?

3 Building Science Research / Technology:

3A Relative level of concern and industry awareness of the following:

- building energy use
- energy costs
- opportunities for improving energy efficiency
- environmental consequences of energy use

3B Use of building-specific benchmarks and performance monitoring

- Where is the adoption greatest and lowest?
- How are the leaders justifying the additional costs of performance metering/monitoring?
- Where does Energy Star fall short in meeting market needs, and how could it be improved?
- What technical developments are necessary for improved performance monitoring?

3C Thoughts around a measurement, verification, and evaluation approach for the nonresidential component of the AB 758 Program

- Opportunities to leverage the utility program and ARRA Measurement and Verification Program
- What are the key metrics that can be used to quantify the impact of the Cal Comprehensive EE program?

3D What is the most important building science research that advances technologies and strategies in order to improve the cost-effectiveness of building energy ratings and comprehensive retrofits? [Ask the following questions to break down this discussion:]

1) What do you see as the most important building science research currently being conducted?
2) Please give us your opinion on the following research areas:
   - Energy Commission PIER research, development, and demonstration (RD&D) efforts
   - Non-Energy Commission RD&D efforts
   - Relevance of technologies and research being targeted in RD&D efforts.
   - Where does current technical research fall short of market needs?
   - How can R&D get more closely aligned with market needs?
   - Who do building owners look to for advanced technology guidance?
3) What technologies are market-ready, have high potential, but are not being adopted, and why?
   - To what extent are/should utilities be driving the adoption of advanced technology?
   - Do industry stakeholders know about the California lighting/HVAC/plug load technology centers?

3E Market research

- Pricing of technology innovations
- What is the price point necessary for technology adoption without subsidies? For adoption with subsidies?
- Pricing of audits and assessments
- How does an acceptable price for audits/assessments vary with building size and complexity?
- What is the tradeoff between the fidelity of assessments and the price?
- What assessment cost can be mandated?

4 Rating Systems:

4A Energy efficiency rating systems for existing buildings within and outside of California:

- ASHRAE's Building Energy Quotient (Building EQ) labeling program (asset rating)
- DOE asset rating (in development)
- UK's Energy Performance (EP) Label project (Asset rating)
- Any other important rating systems?
- What is known about these asset rating systems, and about the principle of asset rating – **how** best can the value of an asset rating be determined and communicated?
- What is the best approach for determining the target cost for a rating system?

4B How do building owners respond to rating systems?

- Energy Star (Operational)
  - How is Energy Star being used by owners?
  - What do owners interpret and respond to their score?
- Other rating systems, such as LEED EB and Green Globes – how do owners perceive the value of these relative to energy efficiency?
- What should be the goals of the rating system?
- Why some rating systems are more widely utilized than others?

5 Disclosure Programs / Legislation:

5A Current practice with regard to due disclosure at time-of-sale, refinance, and other appropriate times (triggers) in the life of a building

- Owners' perspectives on this?
- Lenders' perspectives?
- What value to owners place on disclosure of rating?
- What are the problems you see for disclosure mandates?
- What other triggers should be considered?
- How should voluntary disclosure be handled, and how should that transition to mandatory?

5B Lessons learned from the implementation of AB 1103 and similar legislation nationally and internationally.

- Outreach, Education and Training
    - Develop a comprehensive outreach program
    - Contact building owners directly
    - Partner with local and regional organizations
    - Leverage EPA resources
    - Provide ongoing benchmarking assistance
    - Leverage and educate local businesses
    - Create a web site
    - Conduct a media campaign
- Benchmarking Guidance
    - Align benchmarking guidance to Energy Star benchmarking rules
    - Consider where localized conditions may require specialized benchmarking guidance
    - Establish benchmarking rules for new buildings and condominiums
    - Establish deadlines for requesting and reporting information
- Compliance and Enforcement
    - Use tax assessment data to initially identify buildings and owners
    - Consider augmenting assessment data and encouraging stakeholder feedback
    - Educate the market
    - Enforce noncompliance
    - Assess systematic compliance in program evaluations
- Data Quality Assurance
    - Provide benchmarking training and resources
    - Perform audits of benchmarking information as resources allow
    - Require signatures on submitted benchmarking information
    - Assess systematic data quality in program evaluations
    - Support consumption data uploading by utilities
- Energy Consumption Data
    - Work with utilities to enable enhanced access to consumption data
    - Develop alternative compliance measures where consumption data is inaccessible
    - Encourage building owners to add data access clauses in lease contracts
- Disclosure
    - Define the disclosure
    - Make disclosure web sites functional for consumers
    - Consider integration with public tax assessor database
    - Allow periodic updates to posted benchmarking information
    - Require transactional disclosure early in the transaction process

5C Existing building components of the California Public Utilities Commission's (CPUC) California Long-Term Energy Efficiency Strategic Plan

- What do owners think of the strategic plan? Who is engaged, and who is not?

5D Legislative Initiatives

- AB 32: Greenhouse Gas Reductions
- Title 20: Appliance Efficiency Standard
- Title 24 Updates
- AB 1109 General Service Lamps Standards
- AB 1103 Building Benchmarking
- AB 2404 Water Related Energy Savings
- Federal Appliance and Equipment Standards
- Federal Stimulus in California

5E AB 758 program vision incorporates the possibility of mandatory EE upgrades in the future (as a follow up to voluntary) – how best can this be achieved?

- How do we minimize the push back?
- Give plenty of notice, start by giving generous incentives then reducing as mandatory program approaches?
- Target 'poor' buildings first?
- What should be the minimum benchmark – code? Asset rating score? Other?
- What should trigger the requirement? Point of sale? Time-fixed dates?

6 Energy Efficiency Programs / Auditing:

6A Practices used to evaluate and implement capital and operational improvements. Voluntary efficiency improvement programs sponsored by California utilities

- Are there gaps in these efforts?
- How can owners with properties in multiple utility territories best manage their program activities, especially considering the long term approach that can overlap CPUC program cycles?
- What are the barriers to taking a whole-building performance approach?

6B Use of building-specific benchmarks and performance monitoring

- How best can this be facilitated through utility programs?

6C Integrating efficient operational practices into different classes and sizes of businesses

- Who do building owners look to, for direction on best practice?
- Who are the leaders and laggards?

6D Measurement, verification, and evaluation approach for the nonresidential component of the Program

- Opportunities to leverage the utility program and ARRA Measurement and Verification Program

6E Strategic Plan Initiatives

- Zero Net Energy Buildings Action Plan; HVAC/Lighting/Plug Load action plans; Research & Technology action plan
- On Bill Financing
- Continuous Energy Improvement (CEI)
- Behavioral Programs
- Are owners bought into the long-term vision of ZNE, or is it seen as a trendy buzzword?
- How best can CEI and behavioral programs be incorporated into utility programs, given the current CPUC regulatory/EM&V environment?

7 Market Uptake

7A Relative level of concern and industry awareness of building energy use, energy costs, opportunities for improving energy efficiency, and environmental consequences of energy use

- Beyond concern and awareness, how much confusion is there around what to do and where to find the most useful information? How can this situation be improved?
- What are the criteria for a best practice? To what extent is this source known?

7B Issues with effectively addressing the broad variation of energy system complexity in the commercial building sector

- Any successful precedents in increasing penetration in underserved market sectors? [preferably without the need for high dollar incentives]

7C Building owner receptiveness to new messaging from regulatory agencies and the building industry on a comprehensive efficiency program

- In the current financially-strapped times, what are the most effective ways to communicate issues around EE?

7D Building owner receptiveness to changing existing policies and/or adopting best practices for a comprehensive energy efficiency program

- What is the impact on building evaluations? Lease rates? Occupancy rates?

7E Retro-commissioning and the relative benefits of ongoing commissioning, including market uptake and identification of issues, as identified by the California Commissioning Collaborative

- Commissioning has been promoted for years – what is the market perception, and who is actually doing it? Any ripe market sectors?

7F Naturally-occurring energy efficiency initiatives

- What kinds of EE improvements are happening, even without external intervention? Are there industry groups or individual companies identified as leaders?
- What building types are most aggressively retrofitting?
- What is the profile of the owner that retrofits?

7G Public outreach and education efforts

- What are the primary sources of information and education among key decision-makers in the commercial buildings industry